National Bureau of Standards

TECHNICAL NEWS BULLETIN

JANUARY 1946 No. 345

Hugh L. Dryden Appointed Assistant Director

The appointment of Dr. Hugh L. Dryden as Assistant Director of the Bureau was announced on December 29 by Dr. E. U. Condon, Director. Mr. E. C. Crittenden, who has served as Assistant Director for many years, will continue in that capacity; Dr. Dryden's services will supplement those of Mr. Crittenden. Dr. Dryden is no stranger to his new duties; for nearly a year he has been called upon to "pinch hit" as acting head of the Bureau when both the Director and Assistant Director were unavoidably absent. He will also continue as chief of the Mechanics and Sound Division.

Dr. Dryden was born at Pocomoke City, Md., in 1898. He received his A. B. from Johns Hopkins in 1916, his A. M. in 1918, and his Ph. D. in 1919. He came to the Bureau as a laboratory assistant in 1918, and in only two years was placed in charge of the Aerodynamics Section. He became chief of the Mechanics and Sound Division in 1934.

Outside the Bureau, Dr. Dryden is perhaps best known for his research on air flow. He was chosen to deliver the Wright Brothers Lecture in 1938, and in 1941 received the Sylvanus Albert Reed Award of the Institute of the Aeronautical Sciences "for his contributions to the mechanics of boundary layer flow and to the interpretation of wind tunnel experiments." On December 1, 1942, he was elected president of the Institute.

Much of Dr. Dryden's research work has been on problems submitted by the National Advisory Committee for Aeronautics, and he is the author or coauthor of many of the Committee's reports.

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Reference Fuel Scales for Knock Rating

In a paper presented at the winter meeting of the Society of Automotive Engineers in Detroit on January 11, 1946, Donald B. Brooks, chief of the Bureau's Automotive Section, reviewed the development of knock-rating scales and described a new reference fuel made up from various proportions of triptane and normal heptane. He pointed out that today the antiknock quality of motor fuels is the outstanding characteristic by which they are graded. The average motorist realizes that when he pays more for a premium motor fuel, he is buying higher antiknock quality than is available in regular gasoline. Many even have at least a practical understanding of the term "octane number" by which this quality is now expressed.

A quarter of a century ago, the first yardstick for measuring the antiknock quality of fuels was brought forth in England by H. L. Ricardo. He designed an engine, the compression ratio of which could be varied so as to cause knocking with any fuel then available. The point at which this occurred was called the highest useful compression ratio, abbreviated HUCR, and was used as a measure of the antiknock quality of the fuel.

As interest in knock rating spread, many laboratories used engines conveniently at hand in making their determinations. These varied from small engines designed to power farm-lighting plants to complete automobile and truck engines, and single cylinders of airplane engines. A variety of test procedures was used, and the results frequently were expressed in terms of the blend of high and low reference fuels equalling the test fuel in knock. As there was no uni-

With this issue the TECHNICAL NEWS BULLETIN appears in a new typographical style and size. Larger, more modern type is used for the headings and text. The larger trim size is that in general use for such periodicals. The changes are designed to make the printed page more easily read and to freshen the physical appearance of the BULLETIN. It is hoped that the new format will meet with the approval of the readers of the TNB.

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formity either of test engine, test procedure, or reference fuels used, the results were meaningless except to the laboratory of their origin.

An urgent demand, therefore, arose for standardizing the essential details of knock rating. Under the direction of the Cooperative Fuel Research (CFR) Committee, a test engine was developed and standardized. After considerable study and discussion, the present octane-number scale was adopted. Isooctane, produced at the rate of millions of barrels a month as a large constituent of the aviation fuel that powered the recent war, was unknown 20 years ago. First prepared in 1926, it was found to be of much higher knock rating than any fuel of that time. Blended with normal heptane, a hydrocarbon poorer in knock rating than any fuel then used, it formed the octane-number scale. In this scale, the percentage of isooctane in blend with normal heptane which, in the standard engine, gives knock equal to that of a test fuel is called the octane number of the test fuel.

This scale has proved satisfactory for the knock rating of motor fuels and, naturally, was soon applied to the rating of aviation fuels as well. When improvement in such fuels made them superior in antiknock quality to isooctane, the scale was physically extended by adding the powerful knock suppressor tetraethyl lead to isooctane, and knock ratings were expressed in terms of the amount of tetraethyl lead added to isooctane to equal the test fuel in antiknock quality. The resulting break in the knock-rating scale at 100 octane number, however, has been very troublesome. Many attempts have been made to extend the scale, and two or three have gained limited acceptance.

For some years, a panel of the CFR Aviation Fuels Division has been making an investigation of reference-fuel scales. After extensive research, it is now proposed to define a new scale in terms of blends of triptane, a relatively new compound of exceptionally high knock rating, and normal heptane, to both of which will be added about one-tenth of one percent of tetraethyl lead. Such a scale will cover the range from below present motor fuels to well beyond present and foreseeable future aviation fuels. If need be, it can be further extended readily and logically to the upper limit of antiknock quality. It is also proposed to express knock ratings in terms of "triptane number," analogous to octane number, for fuel blending work, and interchangeably in terms of a "Detonation Index" for engine work.

Moisture Condensation in Buildings

House owners who insulate their dwellings are apt to think that the attendant saving in fuel is an unmixed blessing. However, experience has shown that in many cases insulation of walls, particularly in houses already built, raises problems of moisture condensation that must be seriously considered.

Condensation of moisture in buildings has been found in many cases to involve deterioration, and the Bureau has received numerous requests for assistance in providing remedies. There are three major problems, namely: Condensation on windows causing deterioration of window frames, sills, and wall construction underneath; condensation in crawl spaces causing rusting of metal floor beams, pipes, etc.; condensation in wall and roof construction with attendant loosening of plaster, rotting of wooden members, and deterioration of the insulation itself. A study of specific condensation problems is being made in housing projects in Washington, Dayton, Paducah, Cleveland, Detroit, and other cities so that corrective measures can be adopted and certain principles of building construction laid down for the guidance of Federal Housing Agencies. The results will be made available to the public in the near future.

TECHNICAL NEWS BULLETIN

U. S. DEPARTMENT OF COMMERCE
Henry A. Wallace, *Secretary*

NATIONAL BUREAU OF STANDARDS
E. U. Condon, *Director*

JANUARY 1946 **Issued Monthly** **No. 345**

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Attack on Refractory Clay Pots by Optical Glass

Optical glass is manufactured at the Bureau in refractory clay pots, each of which holds from 1,000 to 2,000 pounds, depending on the density of the glass. The pots are placed in melting furnaces and held at temperatures between 1,350° and 1,450° C for 8 to 20 hours. Reactions always occur under these conditions along the pot-glass interface. These reactions may become of sufficient magnitude to affect the quality of the glass and to seriously damage the pot, which in some instances may fail to hold the glass. Consequently, a study was made of samples of pot bottom before and after the production of glass to determine the manner and extent of attack on the refractory by optical glasses of different compositions and to identify the accompanying reaction products. The results of this study are reported in a paper (RP1689) by W. H. Parsons and H. Insley, in the January number of the Journal of Research.

Visual examinations were made of approximately 200 pots of lined and unlined types used in the manufacture of barium crown, barium flint, light crown, borosilicate crown, and several different flint glasses. Samples from the bottoms of 62 of these pots were examined further with a petrographic microscope. Samples which were badly cracked and penetrated by glass were selected in most instances because they probably showed most clearly the effects of pot attack.

The occasional penetration of the bottoms of unlined pots by corrosive optical glasses was due in large part to the size, elongated shape, and vertical orientation of the pores in the refractory. With barium glasses, such penetration extended to a depth of 2 or 3 inches, but with borosilicate crown and most flint glasses it did not exceed about ½ inch. Pots containing barium glasses occasionally leaked in the melting furnace. Lined pots, however, were not penetrated by any type of glass except when the relatively dense lining was cracked in the bottom.

The corrosive action of barium glasses greatly enlarged the pores in the refractory and caused them to become connected, thus forming a system of branching channels. Borosilicate crown and most flint glasses, however, were only slightly corrosive and, therefore, did not form channels.

The crystalline reaction products at the pot-glass interface of the different types of barium glasses were barium feldspar, alkali aluminum silicates, and cristobalite. In pot bottoms penetrated by these glasses, barium feldspar, barium disilicate, zinc spinel, mullite, and traces of cristobalite and corundum were formed. Alkali aluminum silicates, cristobalite, and corundum occurred at the pot-glass interfaces of borosilicate crown and flint glasses. Mullite and corundum were the only reaction crystals present in the refractory penetrated by these glasses, with the exception of a flint glass with 62 percent of PbO. One or more new lead aluminum silicates of undetermined composition, and a trace of metallic lead occurred with this glass.

The presence of two types of glass was characteristic of refractory penetrated by barium and some lead glasses. One type was a glass altered in composition and certain physical properties by the attack on the pot constituents. This glass contained numerous seeds formed by the entrapment of the air in the original refractory and probably, also by the liberation of gas in the glass batch. The second type of glass bore a close resemblance to the melt.

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Extraction of Alumina From Clays and High-Silica Bauxites

As a result of investigations concerning the utilization of clays and high-silicia bauxites for the production of alumina, two methods of possible commercial application have been developed at the Bureau (Technical News Bulletin 338 (June 1945)). One of these is applicable only to bauxites, the other to both bauxites and clays.

In the former method, a novel feature is the extraction of bauxites with a solution consisting of a mixture of sodium hydroxide and sodium chloride. When the salt is present in sufficient concentration, the amounts of silica contained in the resulting sodium aluminate solutions are much less than when extractions are made with the sodium hydroxide alone. This reduction is caused by the precipitation of silica from solution as the very slightly soluble compound sodalite, $3Na_2O.3Al_2O_3.6SiO_2.2NaCl$, rather than as the relatively soluble sodium aluminum silicate hydrate formed in the absence of salt. Other sodium salts, including the carbonate, nitrate, and bromide, give sodalite-type compounds with sodium aluminum silicate. The chloride and nitrate compounds are the most effective in reducing the silica content of sodium aluminate solutions.

Alumina and soda are recovered from the bauxite-extraction residues by a modified soda-lime-sinter method. Alumina is precipitated from the sodium aluminate solutions by carbon dioxide. In the combined processes, over-all recoveries in excess of 90 percent of the alumina in high-silica bauxites are obtained.

In the other method, which is applicable to both bauxites and clays, the aluminous material is sintered at about 1,300° C with sufficient limestone to convert its alumina to calcium aluminate and its silica to dicalcium silicate. The sinter is then annealed by cooling it slowly from 1,300° to 1,200° C. The annealed sinter dusts to a very fine powder which requires no grinding. This material is extracted with a solution

containing about 200 grams of Na_2CO_3 and 150 grams of NaCl per liter, and an extract containing 70 to 80 grams of Al_2O_3 and 1 to 2 grams of SiO_2 is obtained. By boiling the extract with a seed charge of synthetic sodalite, its silica content is reduced to not more than 0.1 percent of the alumina content. Alumina, suitable for the manufacture of aluminum by electrolytic reduction, is precipitated by passing carbon dioxide into the desilicated solution. About 95 percent of the alumina in the clay is recovered by this method. This is higher than any reported extraction from clay by other alkaline processes, and is equal to, or somewhat higher than recoveries obtained by acid extractions. Losses of soda are small. An outstanding advantage of the process is that all steps can be conducted at atmospheric pressure, whereas many other alkaline methods for the extraction of alumina require autoclave desilication.

In cyclical operation of each of two processes, the spent solution from the alumina precipitation step is used in the treatment of a fresh batch of material. The complete description of this work will be published as RP1691, by E. P. Flint, W. F. Clarke, E. S. Newman, Leo Shartsis, D. L. Bishop, and Lansing S. Wells, in the January Journal of Research.

Specification of Railroad Signal Colors and Glasses

The use of colored lights as signals is almost universal in railroad, highway, marine, and aviation traffic or navigation. To insure that only colors of the proper hue and strength are supplied to the carriers, all parts of purchase specifications dealing with color should rest on a sound and workable basis—suitable for use both by the standardizing laboratory and the inspector, purchaser, or manufacturer.

In 1931 the Signal Section of the Association of American Railroads began a study that led to improved methods of selecting signal colors. As rapidly as the colors were chosen, Corning Glass Works duplicated them in glass. These master standards were then turned over to the Bureau, where they were carefully measured. The result is a set of specifications to be used in the purchase of railroad signal glassware, covering the railroad signal colors, red, yellow, green, blue, purple, and lunar-white.

Duplicates of the master standards, defining the limits of transmission and chromaticity permissible for such glassware, are sent to the Bureau for comparison with the master standards. They may then be purchased by anyone requiring such duplicates, together with a certificate showing how closely they conform to the master standards.

The Bureau's part in this work is described in two papers. The first was published in J. Research NBS **22,** 627 (June 1939 (RP1209), and sets up the luminous-transmission scale used in the specification of railroad signal glasses; it helps to insure that the glassware transmits enough light for the purpose. The second paper will appear in the January 1946 number of the Journal (RP1688). It is entitled Specification of Railroad Signal Colors and Glasses, by Kasson S. Gibson, Geraldine Walker Haupt, and Harry J. Keegan. This paper provides the basis for insuring that the signal colors seen by trainmen will fall within the ranges found by the signal engineers to be best adapted to safe operation of the railroads.

Use of Mooney Viscometer

Experience with the operation of the Mooney viscometer in 18 laboratories indicates the need for better reproducibility of results. In Circular C451, released last month, Rolla H. Taylor gives his conclusions after studying available data from these laboratories, together with reports of numerous experiments made at the Bureau as part of its work on the viscosity of synthetic rubbers. These experiments have brought out the factors that must be considered if reproducibility is to be improved.

It is pointed out that if uniformity in the values of Mooney viscosity on the same sample, with different viscometers and in different laboratories, is to be obtained, the methods of adjustment that must be followed and the precautions that must be taken are cleaning; mechanical calibration; dimensions of dies, die holders, and rotors; die closures; and preparation of test pieces. Each of these items and the errors that may result from maladjustments and lack of precautions in the use of this instrument are discussed.

Copies of C451 are obtainable from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. The price is 5 cents.

Commercial Standard for Men's Sport Shirt Sizes

Commercial Standard CS128–45, which has just been issued, provides standard size designations, methods of measuring, and standard minimum measurements for men's sport shirts made from woven fabrics.

This voluntary standard was established to eliminate the confusion resulting from a diversity of size markings and sizing systems for sport shirts other than those made with neckbands and carrying regular dress shirt size marks, such as 14, 14½, 15, 15½, 16, 16½, and 17.

The printed edition carries a recommended wording for guarantee labels, together with a brief history of the activities that led to the development of the standard. It includes a list of official acceptors, and a roster of the standing committee representing manufacturers, distributors, and users of men's sport shirts that will review suggestions and comment for revision of the standard to keep it abreast of progress in the industry.

Copies of CS128–45 are obtainable from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at 5 cents each.

Mass Spectrometer as a Tool for Research

The Mass Spectrometry Section of the Bureau is an outgrowth of war work that is being continued as a part of the regular organization. Extensive use is being made of the mass spectrometer as an instrument for the quick, convenient analysis of a wide variety of gases and volatile liquids. The sample required for analysis is very small—only a cubic millimeter of gas or vapor—and complex mixtures of closely related organic substances can be analyzed with speed and accuracy unattainable by conventional means.

The mass spectrometer has been used in connection with the Government synthetic rubber program for a variety of purposes, such as determining the composition of feed stocks and intermediates in the production of butadiene, ascertaining the losses of butadiene in vent gases, and finding the purity of isoprene, butadiene, styrene, and other monomers. The purity of specification grade butadiene can be found with a high degree of accuracy by measurement of the freezing point. On fourteen consecutive cross-check samples the percentage of 1,3-butadiene found by the mass spectrometer agreed with that found by the freezing point within an average of 0.08 percent.

The molecular structure of high polymers, such as synthetic rubber and plastics, is being studied by subjecting the polymers to thermal decomposition and analyzing the resulting products by means of the mass spectrometer. In a classical study of the thermal decomposition of natural rubber, conducted several years ago by the late Thomas Midgely, 200 pounds of crude rubber was broken down by destructive distillation in order to get enough of the decomposition products to separate and identify them by the then available means. In the current work, a sample of only a few milligrams—a millionth as much as was required by Midgely—is decomposed in a few minutes in a very high vacuum and the analysis is made and computed within a day or two instead of several months. Furthermore, the use of so small a sample enables the products of decomposition to be removed from the heated zone and condensed by liquid air before secondary reactions can take place.

The original work supported the conclusion that natural rubber was a polymer of isoprene, although the actual recovery of isoprene amounted to only about 10 percent. In the present study the avoidance of secondary reactions leads to the recovery of the order of 90 percent of isoprene from the decomposition products. The principal commercial synthetic rubbers and several of the more common plastics have been investigated by the present means and a report on the subject is in preparation.

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pH of Acid Potassium Phthalate

Aqueous solutions of acid potassium phthalate are used extensively as standards in the calibration of pH assemblies, and for control of the acidity of various solutions. Establishment of the true pH of these solutions is therefore important. In RP1690 in the January Journal of Research, W. J. Hamer, G. D. Pinching, and S. F. Acree report values for the pH of aqueous solutions of acid potassium phthalate prepared with either Standard Sample 84a or 84b issued by the Bureau as acidimetric standards. Values are given for solutions ranging in concentration from 0.001 to 0.2 molal and for temperatures from 0° to 60° C. The pH values are based upon accurate determinations of the two dissociation constants of *o*-phthalic acid and the activity coefficients of the acid phthalate and phthalate ions, obtained from measurements of galvanic cells without liquid junction. The pH values range from 3.88 to 4.42 and are not very different at the various temperatures. At 25° C, the pH of a 0.05-molal solution is 4.005. Solutions of this strength are used most widely. Solutions prepared with Standard Samples 84a and 84b agree within 0.001 pH unit at the various temperatures. It is expected that other Standard Samples of acid potassium phthalate, having purities comparable with Standard Samples 84a and 84b, will have pH values equal to those of Standard Samples 84a and 84b.

The authors give directions for the preparation of buffer solutions of acid potassium phthalate. Densities of the solutions at 20° and 25° C are reported so that the solutions may be prepared either on a molar or a molal scale of concentration. No preservative is necessary and the solutions may be kept in glass-stoppered Pyrex bottles for at least six months without a change in pH.

Stability of Double-Walled Manganin Resistors

All measurements of power and energy made by the electrical industry of this country depend ultimately upon the units of electrical resistance and of electromotive force. These units are maintained at the Bureau by means of a group of standard resistors and standard cells. One of the Bureau's functions is the improvement of standards used for maintenance of these units, and, along these lines, James L. Thomas has developed a standard resistor that is far superior to those previously used. The new resistors which are described in the January Journal of Research (RP1692), are so constant in resistance that of a group of ten, no one has changed by more than 1 part in a million in 10 years. A change of 1 part in a million is the equivalent of a change of about 1 foot in a distance of 200 miles.

New Standard Samples

The Bureau has inaugurated a series of standard samples for use in the preparation of buffer solutions of known pH values from 0° to 60° C, and in the calibration of instruments for the measurement and control of pH. Three standards of this series are now available, acid potassium phthalate, potassium dihydrogen phosphate-disodium hydrogen phosphate, and borax (sodium tetraborate decahydrate). The two phosphates are intended to be used together.

Sample number	Material	Recommended concentration, moles per liter of solution	pH value at 25°C	Approx. wt of sample	Price per sample
				Grams	
185	Acid potassium phthalate	0.05	4.005	60	$3.00
186	Potassium dihydrogen phosphate (186-I).	.02	6.866	60	6.00
	Disodium hydrogen phosphate (186-II).	.02			
187	Borax	.01	9.177	30	3.00
139	Steel (N. E. 8637) (approx. 0.5 Ni, 0.5 Cr, 0.17 Mo).			150	3.00
152	Steel (B. O. H.) (Tin-bearing, approx. 0.04 Sn).			150	2.00
155	Steel (approx. 0.5 Cr, 0.5 W).			150	3.00
156	Steel (N. E. 9450) (approx. 1.4 Mn, 0.5 Ni, 0.4 Cr, 0.13 Mo).			150	3.00

Orders should give both the number and the name of the sample wanted. No samples of smaller size than those listed are distributed, and the remittance should accompany the order.

The Bureau now issues more than 300 different kinds of standard samples, comprising steels, irons, ferroalloys, nonferrous alloys, ores, ceramic materials, certain high-purity chemicals, hydrocarbons, paint pigments for color, oils for viscometer calibrations, certain reference standards, and melting point standards. A complete list of the standards, fees, and other information is given in the Supplement to Circular C398, which can be obtained free of charge upon application to the Bureau.

I. J. Fairchild, Chief of Trade Standards Division, Retires

The Bureau regrets to announce the loss of the services of I. J. Fairchild, chief of its Trade Standards Division since this division was set up in 1929. Mr. Fairchild exercised his optional retirement privilege on November 30, 1945 after 30 years of Government service, 23 of which were spent at the Bureau. The work which he inaugurated is recognized as having been an important factor in the voluntary maintenance of reasonable quality standards for goods bought and sold in the United States in the face of keen peacetime competition and later of war-created material and labor shortages. Within the past few years a number of special standards have been adopted that are concerned entirely with commodities for export, and it is believed that they will prove valuable in building up our foreign trade.

Mr. Fairchild transferred to the Bureau from the Navy Department in 1922 as a mechanical engineer on the staff of the Mechanics and Sound Division. His Technologic Paper T319 on the holding power of wood screws, based on tests of over 10,000 screws in seven commonly used woods, published in 1926, is still regarded as authoritative and has been quoted in many handbooks. In the drafting of Commercial Standards, he has always carefully considered the results of laboratory work bearing on the subject. It is understood that he plans to enter trade association work, so that, in a sense, he will still be carrying on the program commenced at the Bureau and which has led to the adoption of Commercial Standards covering 130 commodities.

F. W. Reynolds, who has been chief of the Chemical and Miscellaneous Products Section and assistant chief of the Division, has been designated as acting chief.

Heliographic Signaling Mirrors

A pocket-size mirror will reflect flashes of sunlight readily visible to an observer sometimes as much as 10 miles away. Because of this power of a small, inexpensive device to attract attention at considerable distances, all branches of the American armed services now equip lifeboats, rafts, and floats with heliographic signaling mirrors, each having some means for a signaler to aim the sunlight flashes from it. These mirrors have passed through several stages of development.

The earliest aiming device was a small screen to be held in front of part of the mirror and used to align the reflected beam of light. In 1942, a better method of aiming was worked out by L. L. Young, of the Bureau's staff, but this required simultaneous observations of a distant target and of a nearby image in the rear of the mirror. Several months later, C. H. Learned, of Carmel, California, suggested to the National Inventors Council that a retroreflector of one of the types widely used in night-visible traffic signs be fastened behind the clear window of a metal-on-glass mirror. Because part of the light returned toward the sun by the retroreflector thus placed is reflected rearward by the glass surfaces of the window, a signaler looking past the edge of the reflector through the window can see an imperfectly formed image of the sun in the direction in which the mirror is reflecting sunlight. Aiming such a mirror is merely a matter of turning it so as to place this bright spot (usually colored red by the retroreflector) upon the target.

R. S. Hunter, of the Bureau's Photometry and Colorimetry Section, has developed, with the aid of manufacturers, two models of the improved type of signaling mirror suggested by Mr. Learned. In the first, a flat retroreflector is tilted at about 30° behind the mirror window. In the second, a flat washer of retroreflective material is held by a cover glass against the rear of the window. The first mirror must always be rotated in its own plane until the retroreflector faces roughly toward the sun before the red aiming spot can be seen, but the second does not have to be so oriented. This washer-type retroreflector mirror is the easiest of all the types to operate and its general adoption as a signaling device for inclusion in lifeboats, liferafts, and life vests is therefore recommended.

New and Revised Publications Issued During December 1945

Journal of Research [1]

Journal of Research of the National Bureau of Standards, volume 35, number 4, October 1945 (RP1671 to RP1675, inclusive). Price 30 cents. Annual subscription, 12 issues, $3.50.

Circular [1]

C451. Factors affecting results obtained with the Mooney viscometer. Rolla H. Taylor. Price 5 cents.

Simpified Practice Recommendations [1]

R6–45. Files and rasps (American pattern, and curved-tooth milled files). (Supersedes R6–44.) Price 10 cents.
R212–45. Cast-brass solder-joint fittings. Price 5 cents.

Commercial Standard [1]

CS128–45. Men's sport-shirt sizes—woven fabrics (Other than those marked with regular neck-band sizes). Price 5 cents.

Technical News Bulletin [1]

Technical News Bulletin 344, December 1945. Price 5 cents. Annual subscription, 50 cents.

Mimeographed Material

Letter Circulars

[Letter Circulars are prepared to answer specific inquiries addressed to the National Bureau of Standards and are sent only on request to persons having a definite need for the information. The Bureau cannot undertake to supply lists or complete sets of Letter Circulars or send copies automatically as issued.]

LC805. List of published material in relation to home building and maintenance. (Supersedes LC771.)

LC808. Standards and specifications for building and construction materials, fixtures, supplies and equipment. (List.) (Supersedes LC619.)

LC811. Publications relating to building codes and construction practice, home building, building material specifications, home maintenance. (Supersedes LC796.)

LC812. Artificial abrasives and abrasive products. (Supersedes LC540.)

Recent Articles by Members of the Bureau's Staff Published in Outside Journals [2]

The 24-hour question. Ralph E. Gould. Gruen Time (Gruen Watch Co., Time Hill, Cincinnati, Ohio) 4, No. 5, 18 (Christmas 1945 Promotion Issue).

Theory of the ultraviolet absorption spectrum of diphenyl. Dissertation for degree of Doctor of Philosophy, the Catholic University of America. Albert London. J. Chemical Physics (Am. Inst. of Physics, 57 East 55th St., New York 22, N. Y.) 13, No. 10, 396 (October 1945).

Effect of pressure on the melting of crystalline rubber. Lawrence A. Wood, Norman Bekkedahl, and Ralph E. Gibson. J. Chemical Physics 13, No. 11, 475 (November 1945).

Survey of adhesives and adhesion. II. R. C. Rinker and G. M. Kline. Modern Plastics (122 East 42d St., New York 17, N. Y.) 23, No. 3, 164 (November 1945).

Pallet simplification. Alvin Hertwig. Shipping Management (425 Fourth Ave., New York, N. Y.) 10, No. 10, 26 (October 1945).

The radio proximity fuze. Ralph G. Peters. Communications (Bryan-Davis Co., 19 East 47th St., New York, N. Y.) 45 (October 1945).

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[1] Send orders for publications under this heading only to the Superintendent of Documents, Government Printing Office Washington 25, D. C. Subscription to Technical News Bulletin, 50 cents a year; Journal of Research, $3.50 a year (to ardresses in the United States and its possessions and in countries extending the franking privilege); other countries, 70 cents and $4.50, respectively.

[2] These publications are not obtainable from the Government, unless otherwise stated. Requests should be sent direct to the publishers.

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